MODIFICATIONS TO THE THREE-COMPONENT CLASSIFICATION ALGORITHM FOR SAR DATA

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ABSTRACT

Previously, a scattering 1110(1 ('1 was used to classify SAR data as due to three mechanisms, namely, surface 01 odd-bounce scattering, double-bounce scattering, and volume scattering (Freeman, Durden, and Zimmermann, *Proc.* 1[;/411'5',$ '92, pp. 1986 1989, 199?), A Bragg rough-surface model was used for odd-bounce scattering, and two reflecting surfaces, as in a dihedral ('01" 11('1" reflector, 1'(')I'('s('1I{ ('(1 the (10111)1(' - bounce scattering mechanism. A random collection of infinitely thin cylinders was used to model the volume scattering contribution. It was assumed that the cylinders are uniformly oriented in all (lii'('("{iol)s.

In this IN'oil{, modifications are made to the above model, which include specifying a preferred orientation for the cylinders representing branches, and using thin cylinders of finite thickness as 0])1)05(s(1 10 infinitely thin ones. In the first case, the preferred orientation is represented by a probability density function in the form of a dirac delta function. For the second case, small argument asymptotic expansions of 11('ssel functions are used to express the volume scattering contributions in terms of quantities containing the average radius of the cylinders. Since in each case the number of unknowns exceeds that of equations, simplifying assumptions are made. The solutions are applied to multifrequency polarimetric SAR data to obtain the new unknowns in addition to the relative contributions of each scattering mechanism. Several results are presented. It is found that the calculated percentage of each mechanism does not change significantly compared 10 the original model, however, additional information is gained about the scatterers.